

11-3 Geometric Sequences

-sequence in which each term after the first is found by multiplying the previous term by a constant (common ratio)

ex:

3, 12, 48, ...

$$r = \underline{4}$$

$$\frac{12}{3} = \frac{48}{12} = 4$$

ex:

100, 20, 4, ...

$$r = \underline{\frac{1}{5}}$$

$$\frac{20}{100} = \frac{4}{20}$$

ex:

2, 6, 18, 54...

$$r = \underline{3}$$

Develop the formula.

$$a_2 = 2 \cdot 3 = 6 \quad a_n = a_1 \cdot r^{n-1}$$

$$a_3 = 2 \cdot 3^2 = 18$$

$$a_4 = 2 \cdot 3^3 = 54$$

To find the nth term:

$$a_n = a_1 \cdot r^{n-1}$$

$$a_7 = 2 \cdot 3^6$$

$$a_7 = 1458$$

ex:

3, 9, 27, ...

Find a_7

ex:

100, 25, 6.25, ...

$$r = \frac{1}{4}$$

Find a_5

$$a_5 = 100 \cdot \left(\frac{1}{4}\right)^4$$

$$a_5 = \frac{25}{64}$$

ex:

Write an equation for a_n

5, 10, 20, 40, ...

$$r = 2$$

$$a_n = 5(2)^{n-1}$$

ex:

$$a_7 = \underline{1536}$$

$$a_3 = 96$$

$$r = 2$$

$$a_n = a_1 \cdot r^{n-1}$$

$$a_7 = a_3 r^{7-3}$$

$$a_7 = 96(2)^4$$

Geometric Means--terms between two given terms

ex:

Find three geometric means between 300 and $\frac{6075}{64}$

$$300, _, _, _, \frac{6075}{64}$$

$$a_n = a_1 r^{n-1}$$

$$\frac{6075}{64} = 300(r)^{5-1}$$

$$\left(\frac{81}{256}\right)^{\frac{1}{4}} = (r^4)^{\frac{1}{4}}$$

$$\pm \frac{3}{4} = r$$

$$\boxed{225, \frac{675}{4}, \frac{2025}{16}, -225, \frac{675}{4}, -2025, \frac{1}{16}}$$

DO: 1.

Find three geometric means between -3 and -12,288

$$r = \pm 8$$

$$-24, -192, -1536$$

$$24, -192, 1536$$

$$2. a_6 = ? 243$$

$$a_1 = 16,807$$

$$r = \frac{3}{7}$$

$$a_1 = 2000$$

$$r = \frac{4}{5}$$

$$a_6 = 655.3616$$

$$r = 1.04$$

HW

p591

15, 17, 21, 23, 31- 39odd, 38, 43, 45